

CLAIM

1. A waveguide group branching filter comprising:
- 5 a circular-to-square waveguide multistage transformer connected to an input port;
- a branch waveguide polarizer/branching filter connected to said circular-to-square waveguide multistage transformer;
- a first waveguide band-pass filter connected to a branching end of said branch waveguide polarizer/branching filter;
- 10 a rectangular waveguide multistage transformer connected to one end of said branch waveguide polarizer/branching filter;
- a rectangular waveguide H-plane T-branch circuit connected to said rectangular waveguide multistage transformer;
- a second waveguide band-pass filter connected to said rectangular waveguide H-plane T-branch circuit; and
- 15 a third waveguide band-pass filter connected to said rectangular waveguide H-plane T-branch circuit;
- characterized in that:
- a circuit structure including said circular-to-square waveguide multistage transformer, said branch waveguide polarizer/branching filter, said
- 20 rectangular multistage transformer, said rectangular waveguide H-plane T-branch circuit, and said first, second and third waveguide band-pass filters is formed by boring two metal blocks from their surfaces;
- a first radio wave of a first frequency band which has the polarization plane perpendicular to the branch plane of said waveguide polarizer/branching filter, a second radio wave of said first frequency band which has the polarization plane parallel to the branch plane of said branch

waveguide polarizer/branching filter, and a third radio wave of a second frequency band higher than said first frequency band which has the same polarization plane as that of said first radio wave are incident to said input port; and

5 said first radio wave is emitted from said third waveguide band-pass filter, said second radio wave is emitted from said first waveguide band-pass filter, and said third radio wave is emitted from said second waveguide band-pass filter.

10 2. The waveguide group branching filter according to claim 1, characterized in that the branch waveguide polarizer/branching filter is formed by a square waveguide and a single coupling hole formed through one side wall of the square waveguide at the branching end of said branch waveguide polarizer/branching filter.

15 3. The waveguide group branching filter according to claim 1, characterized in that the branch waveguide polarizer/branching filter is formed by a square waveguide and two coupling holes formed through one side wall of the square waveguide at the branching end of said branch
20 waveguide polarizer/branching filter.

25 4. The waveguide group branching filter according to claim 1, characterized in that the branch waveguide polarizer/branching filter is formed by a square waveguide, a single coupling hole formed through one side wall of the square waveguide at the branching end of said branch waveguide polarizer/branching filter and a thin metal sheet inserted in said square waveguide.

5. The waveguide group branching filter according claim 1, characterized in that the branch waveguide polarizer/branching filter is formed by a square waveguide, two coupling holes formed through one side wall of the square waveguide at the branching end of said branch waveguide polarizer/branching filter and a thin metal sheet inserted in said square waveguide.

6. The waveguide group branching filter according to claim 1, further comprising a circularly polarized wave generator connected between the input port and the circular-to-square waveguide multistage transformer and composed of a circular waveguide and a dielectric plate inserted in the circular waveguide,

characterized in that the circuit structure including the circularly polarized wave generator is formed by boring two metal blocks from their surfaces.

7. The waveguide group branching filter according to claim 1, further comprising a circularly polarized wave generator connected between the input port and the circular-to-square waveguide multistage transformer and composed of a circular waveguide and a plurality of metal pins mounted on the side wall of the circular waveguide,

characterized in that the circuit structure including the circularly polarized wave generator is formed by boring two metal blocks from their surfaces.

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8. The waveguide group branching filter according to claim 1, further comprising a circularly polarized wave generator connected between the input

port and the circular-to-square waveguide multistage transformer and composed of a circular waveguide and a plurality of grooves cut in the side wall of the circular waveguide,

characterized in that the circuit structure including the circularly polarized wave generator is formed by boring two metal blocks from their surfaces.

9. The waveguide group branching filter according to claim 1, characterized in that:

the first waveguide band-pass filter is formed by n rectangular cavity resonators and n iris-type coupling holes;

the second waveguide band-pass filter is formed by m rectangular cavity resonators and $m+1$ iris-type coupling holes; and

that third waveguide band-pass filter is formed by n rectangular cavity resonators and $n+1$ iris-type coupling holes.

10. The waveguide group branching filter according to claim 1, characterized in that:

the second waveguide band-pass filter is formed by m rectangular cavity resonators and $2m+2$ post-type coupling holes; or

the third waveguide band-pass filter is formed by n rectangular cavity resonators and $2n+2$ post-type coupling holes.

11. The waveguide group branching filter according to claim 1, characterized in that:

the second waveguide band-pass filter is formed by m rectangular cavity resonators and $3m+3$ double-post-type coupling holes; or

the third waveguide band-pass filter is formed by n rectangular cavity resonators and $3n+3$ double-post-type coupling holes.

12. The waveguide group branching filter according to claim 1,
5 characterized in that:

either the first or third waveguide band-pass filter is replaced with a waveguide low-pass filter formed by a corrugated or stepped rectangular waveguide.

13. The waveguide group branching filter according to claim 1,
10 characterized in that:

the second waveguide band-pass filter is replaced with a waveguide high-pass filter formed by a corrugated or stepped rectangular waveguide.

14. The waveguide group branching filter according to claim 1, further
15 comprising:

a rectangular waveguide E-plane T-branch circuit connected to the branching end of the branch waveguide polarizer/branching filter and the first waveguide band-pass filter; and

20 a fourth waveguide band-pass filter connected to the rectangular waveguide E-plane T-branch circuit,

characterized in that:

25 constituent circuits including said rectangular waveguide E-plane T-branch circuit and said fourth waveguide band-pass filter is formed by boring two metal blocks from their surfaces; and

a fourth radio wave of the second frequency band which has the same polarization plane as that of the second radio wave is incident to the input port,

the fourth radio wave being emitted from said fourth waveguide band-pass filter.

15. The waveguide group branching filter according to claim 14,
5 characterized in that:

the first and third waveguide band-pass filters are each formed by n rectangular cavity resonators and $n+1$ iris-type coupling holes; and

the second and fourth waveguide band-pass filters are each formed by m rectangular cavity resonators and $m+1$ iris-type coupling holes.

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16. The waveguide group branching filter according to claim 14,
characterized in that the fourth waveguide band-pass filter is replaced with a
waveguide high-pass filter formed by a corrugated or stepped rectangular
waveguide.

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